MIXED-SIGNAL FINITE STATE MACHINE MODELS ENSURING ANALOG CONTINUITY

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ABSTRACT

A modeling technique that extends the formalism of finite state machines to analog and mixed-signal systems is proposed. The intended use of this technique is to generate continuous mixed-signal models from a state diagram description. Analog equations can be associated with the states of a finite state machine. A state vector ensures analog continuity between state equations during transitions. Specifically, the state vector components are weight coefficients that vary continuously between 0 and 1, thereby allowing the different state equations of an analog variable to be enabled or disabled depending on which state is active. The state vector formalism supports concurrency (i.e. several states being active at the same time) as well as interrupted transitions (i.e. transitions occurring before the transition time of a previous transition has elapsed). The profile and duration of a transition can be set, thereby allowing a user to accurately match the real behavior of a system as well as aid the simulator to converge.